



Royal Netherlands
Meteorological Institute
*Ministry of Transport, Public Works
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Observations of the 2010 Wildfires in Russia

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Introduction

- Russia suffered from an exceptionally strong heat wave during the summer of 2010.
- The fires during the dry and warm period caused large environmental problems in Moscow and other cities.
- The fires and droughts had large effects on the grain harvest, resulting in a Russian export ban of grain and raising food prices world-wide.





Moscow. Left: 17 June, right: 7 August 2010

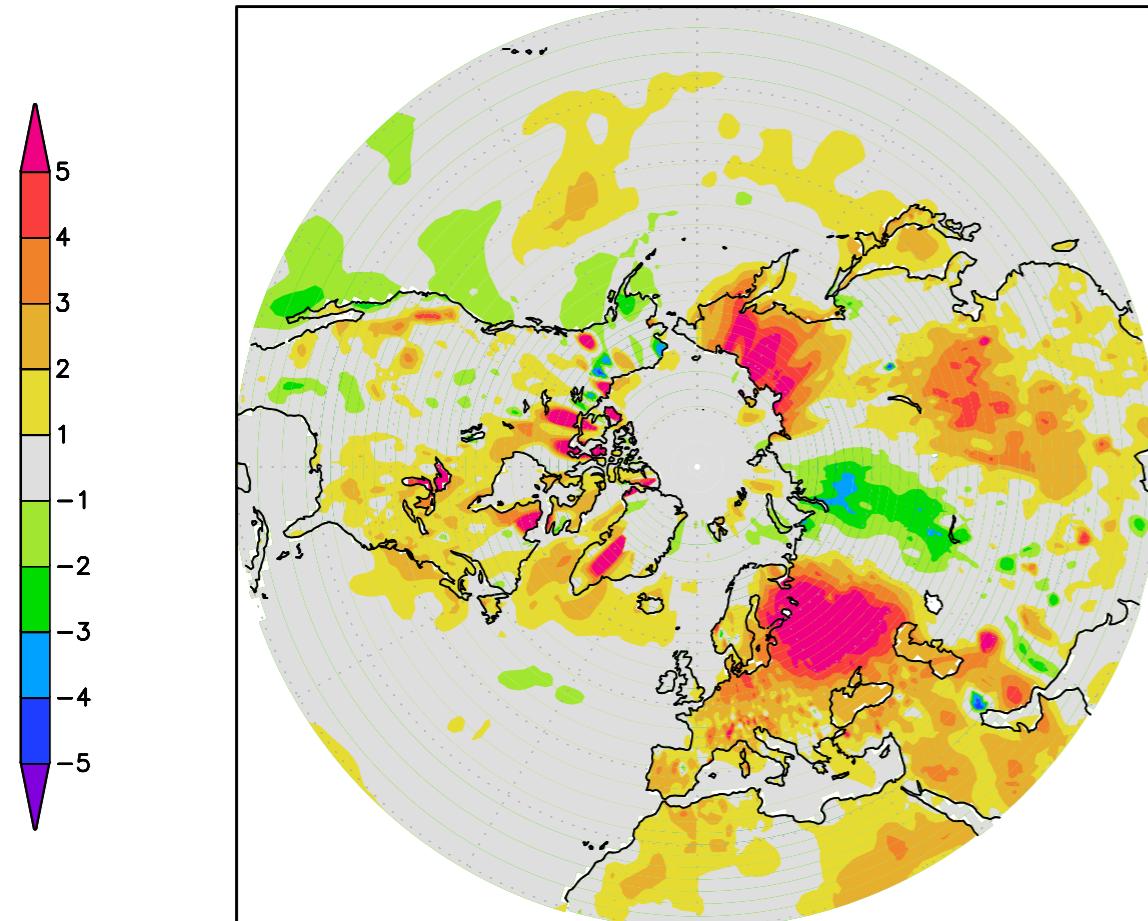
Source: Wikipedia

RUSSIA'S GRAIN-PRODUCING REGIONS AND CURRENT CRISIS



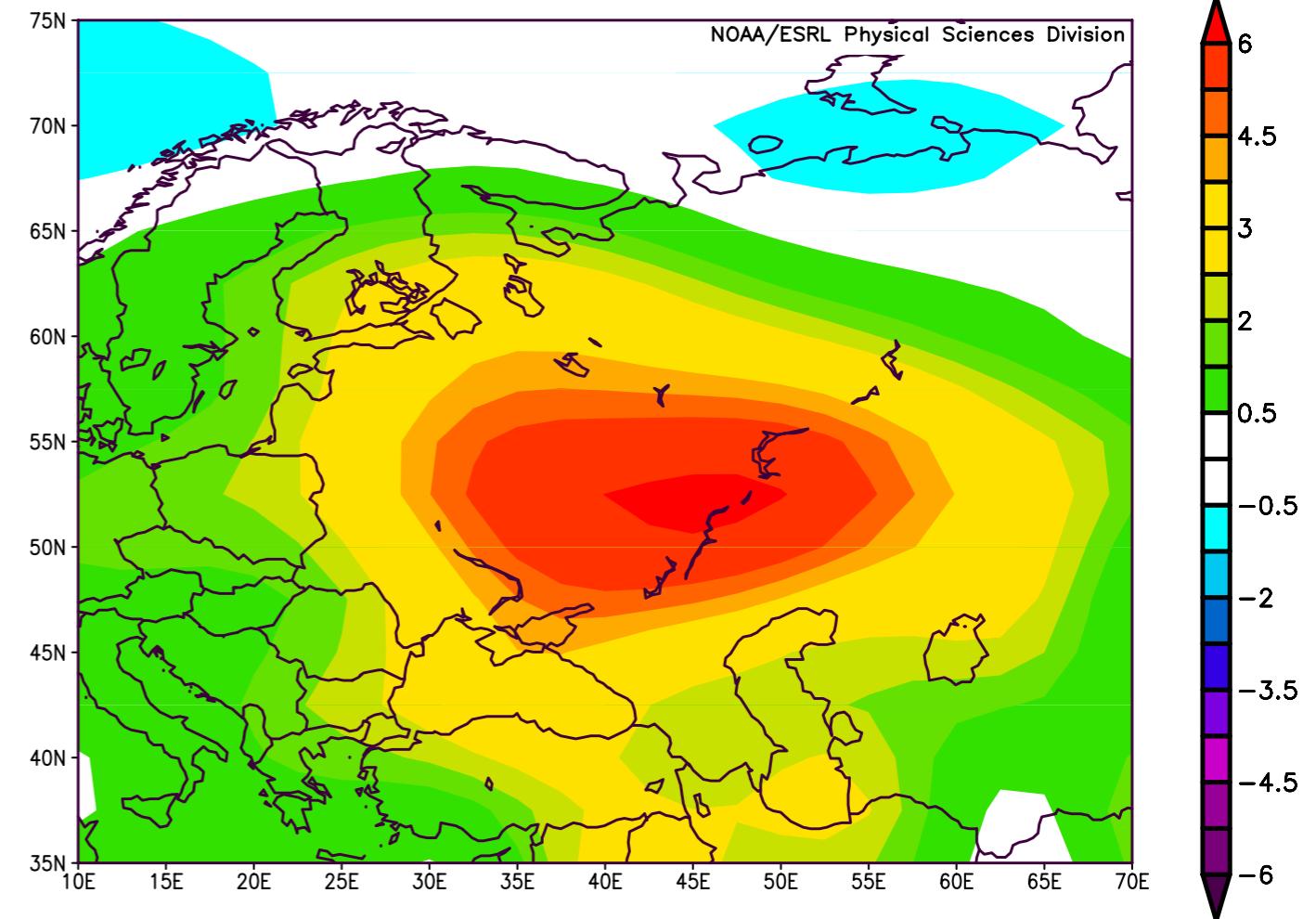
Temperature Anomalies 2010

tmp2m-clim7100 Jul2010
GHCN/CAMS t2m



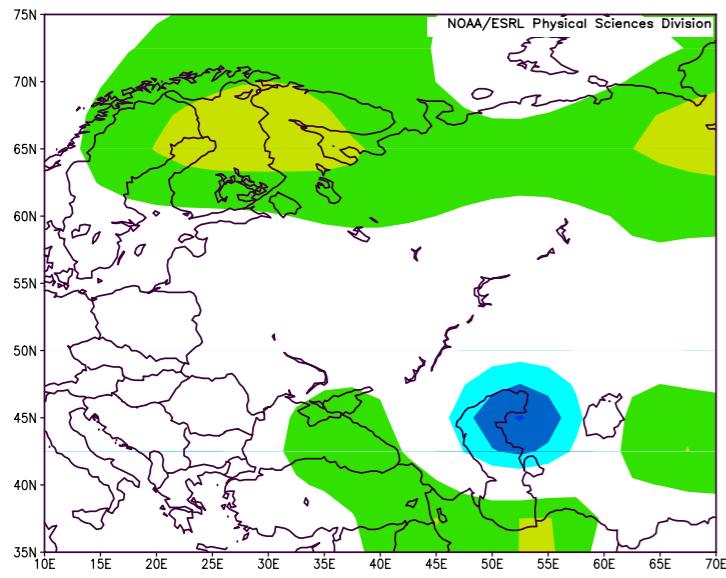
sst-clim7100 Jul2010
Reynolds v2 SST

T₁₀₀₀ hPa Anomaly JJA 2010

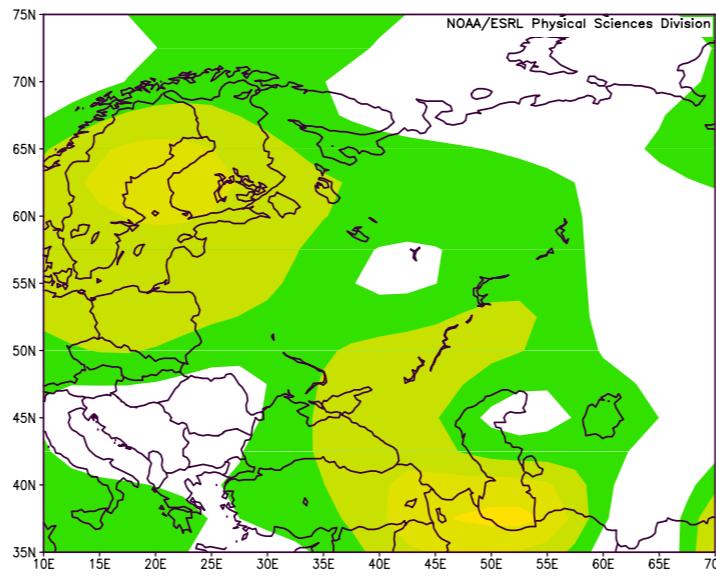


Temperature Anomalies 2005-2010

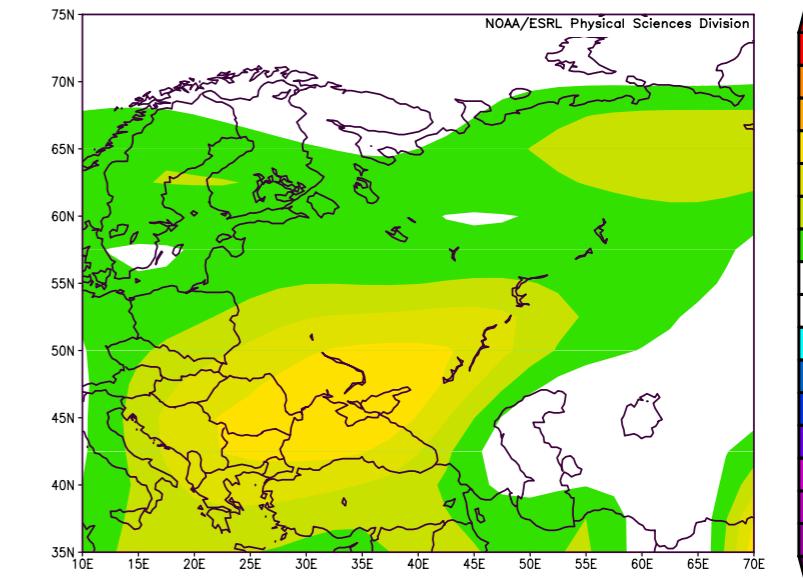
2005



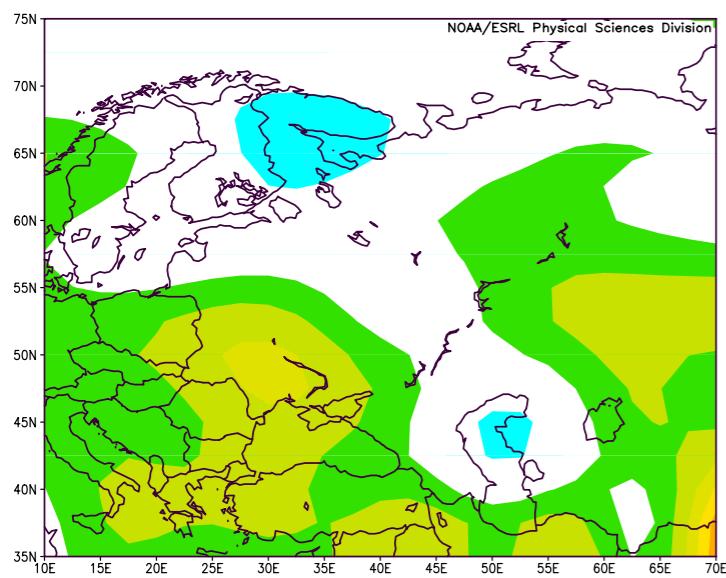
2006



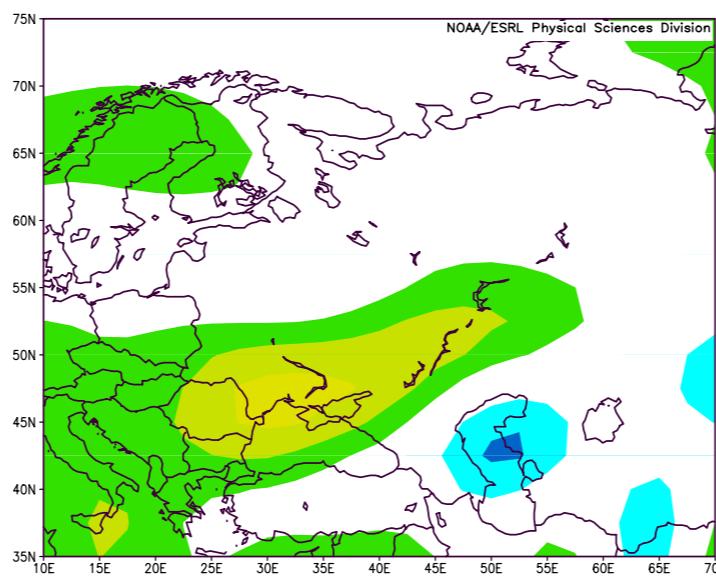
2007



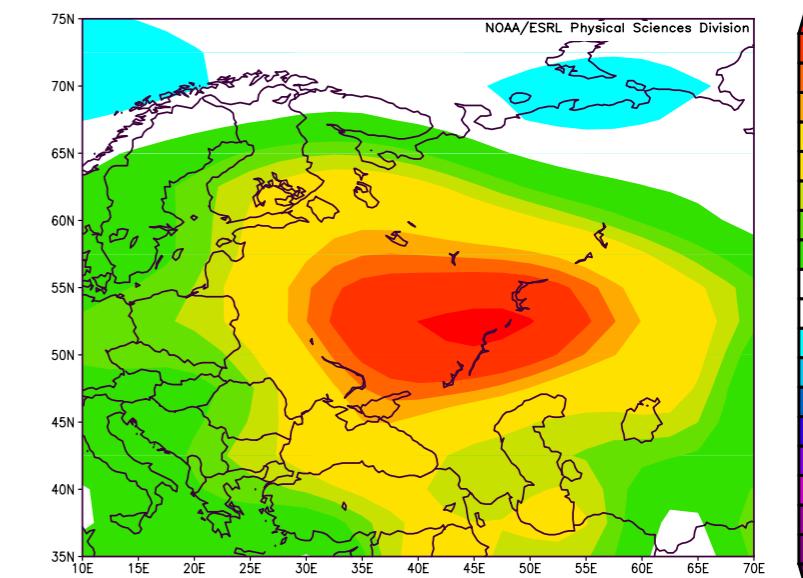
2008



2009



2010

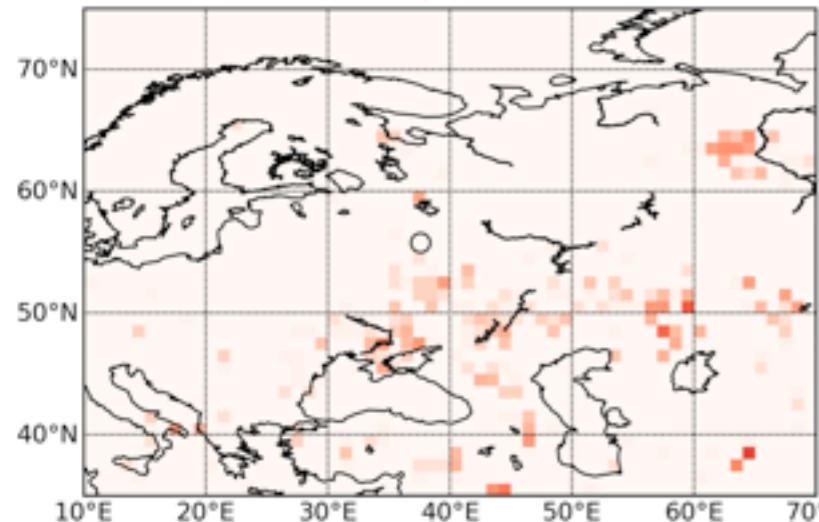


T₁₀₀₀ hPa Anomaly JJA

Fire Counts

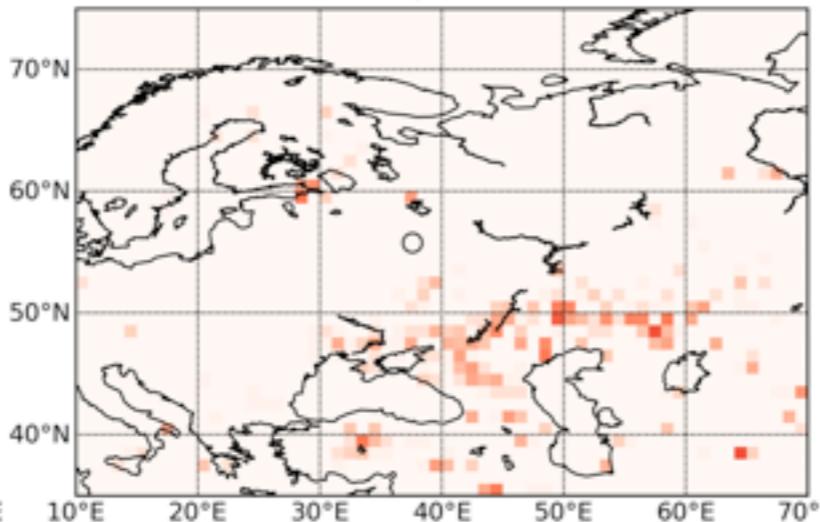
2005

WFA Fire Counts, Alg. 1, 2005-08, Total 801



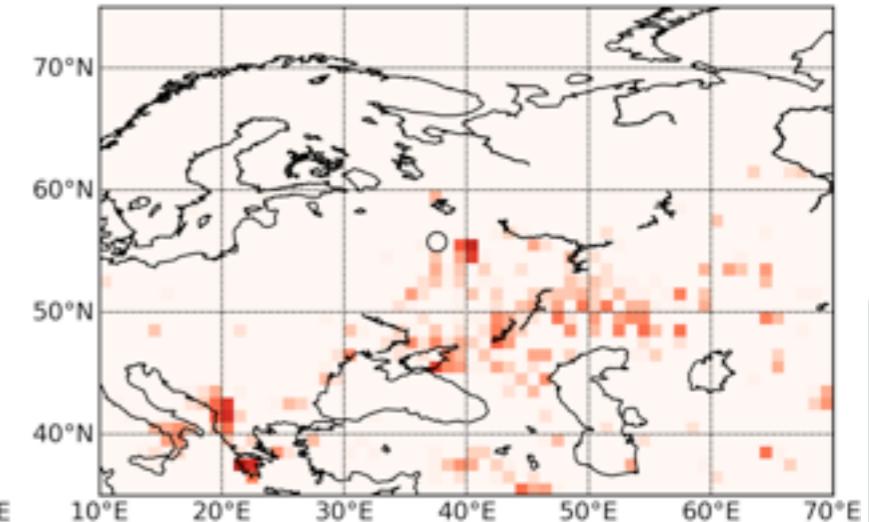
2006

WFA Fire Counts, Alg. 1, 2006-08, Total 961



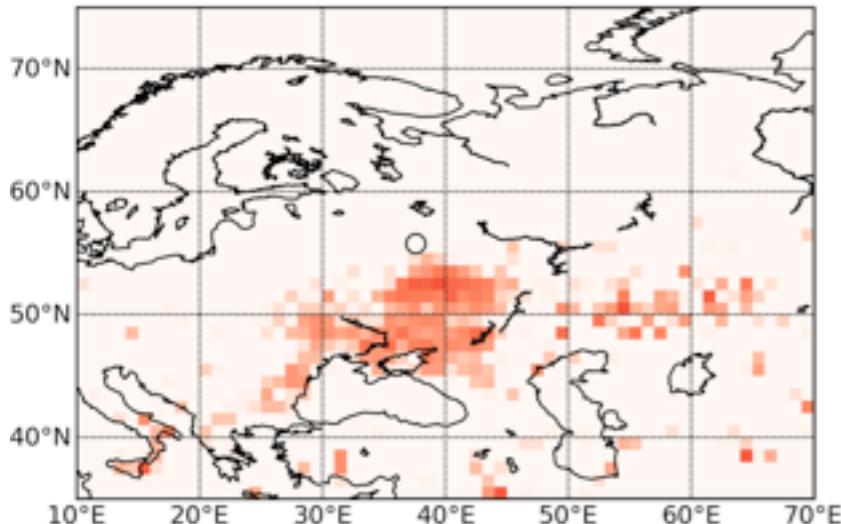
2007

WFA Fire Counts, Alg. 1, 2007-08, Total 2155



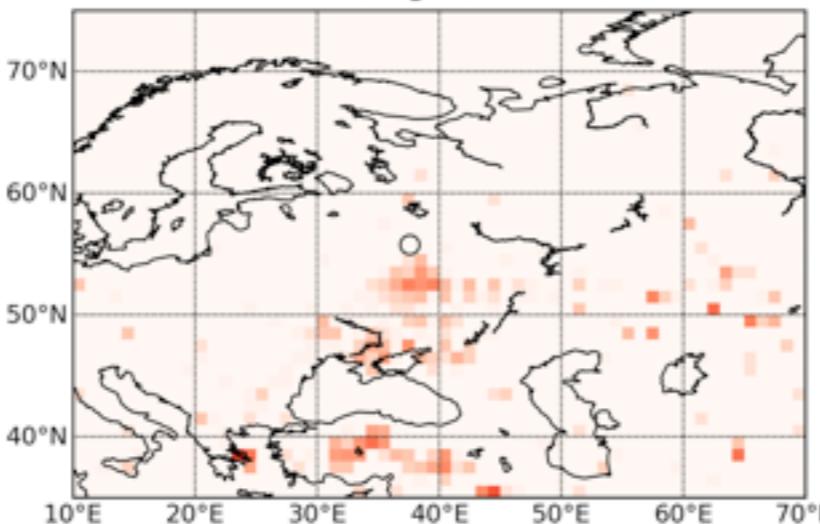
2008

WFA Fire Counts, Alg. 1, 2008-08, Total 2273



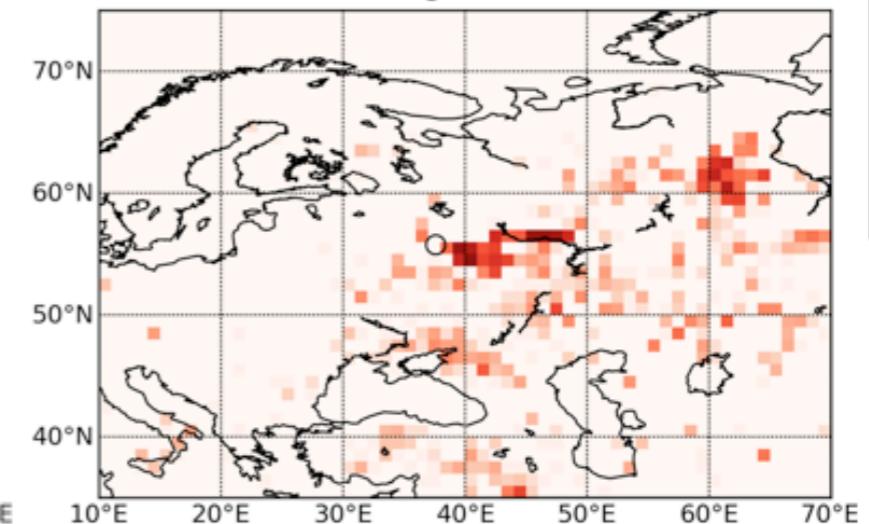
2009

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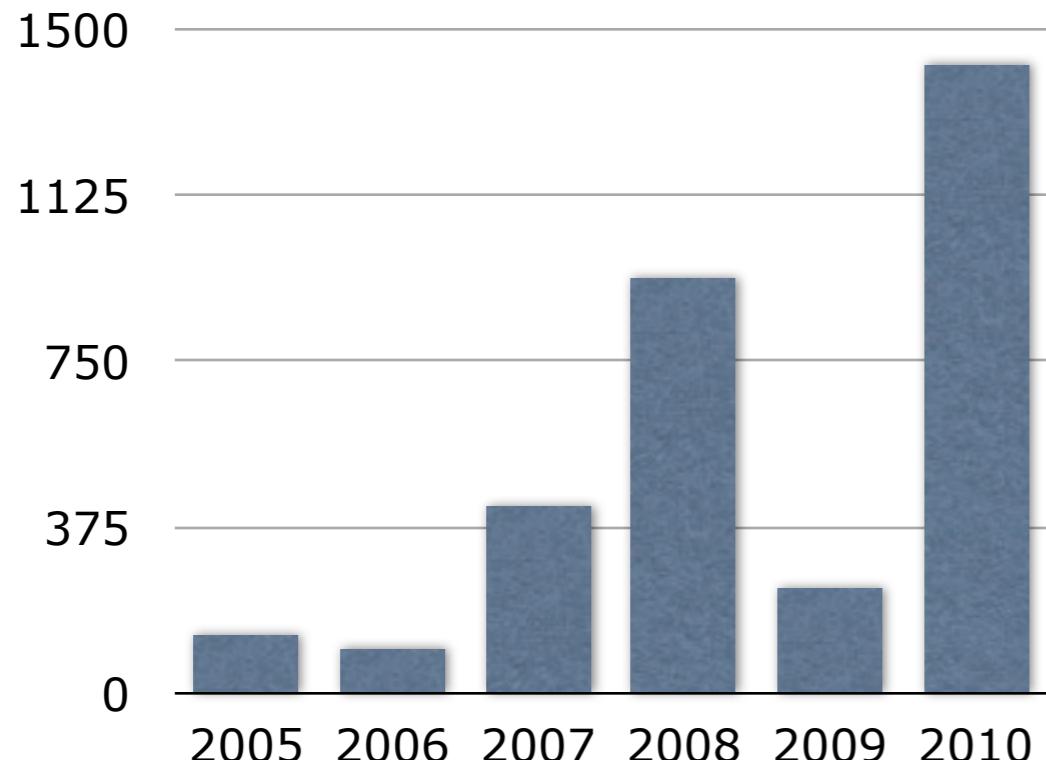


2010

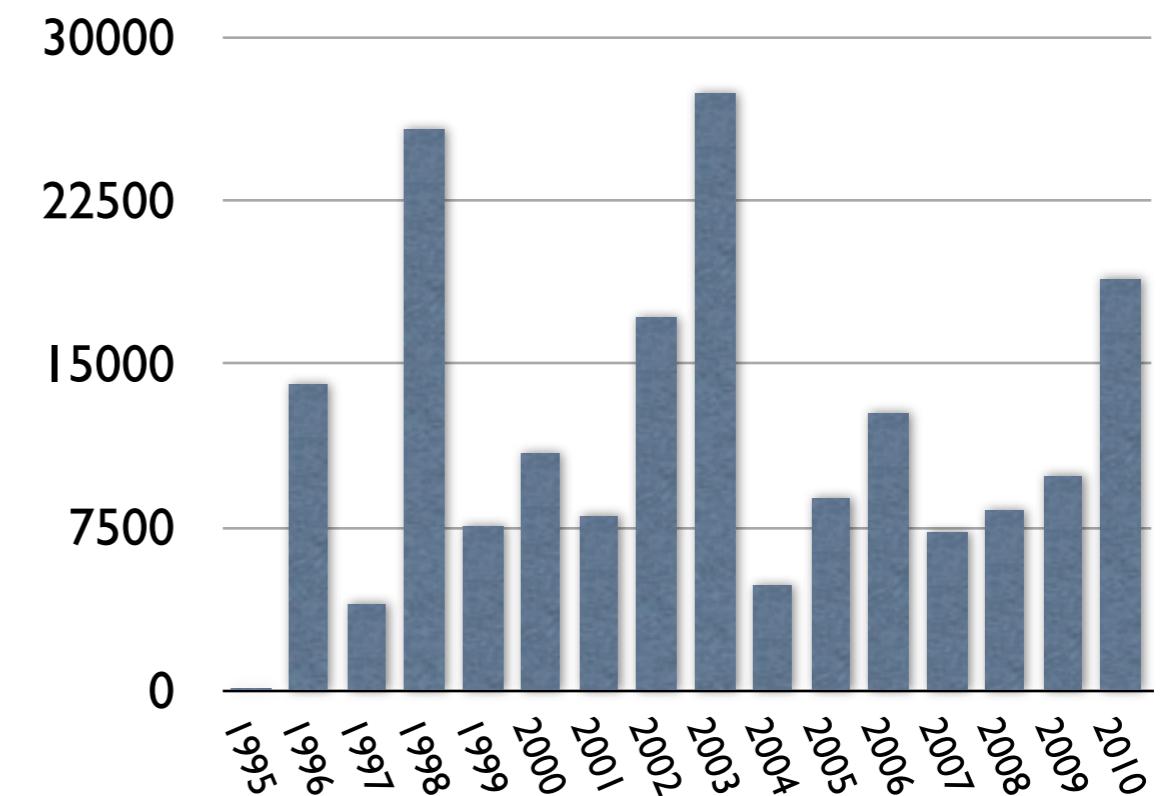
WFA Fire Counts, Alg. 1, 2010-08, Total 5301



Fire Counts Time Series



Number of fires in a box of 1000 km x
1000km around Moscow in August



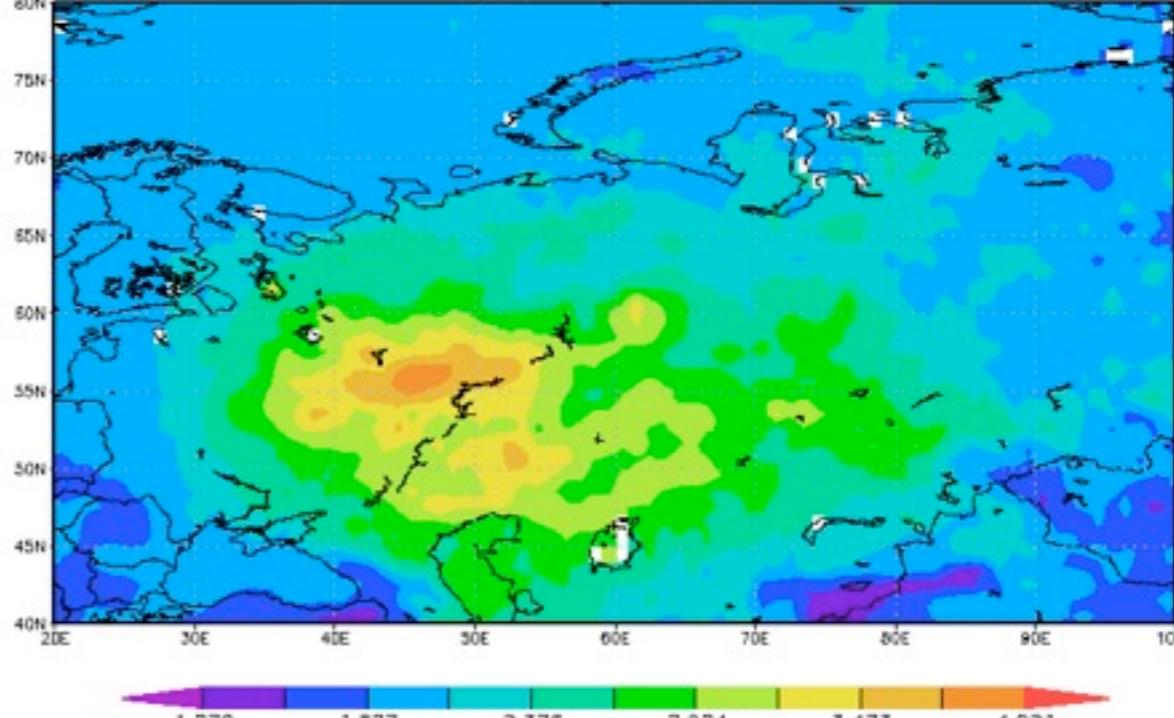
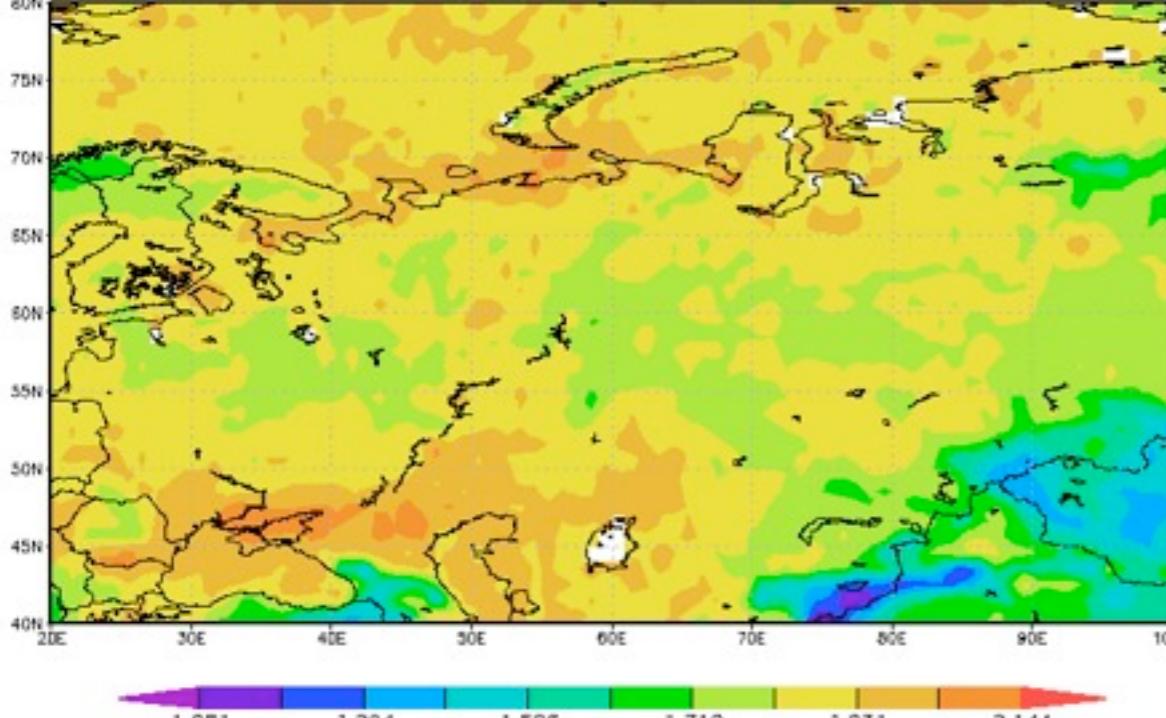
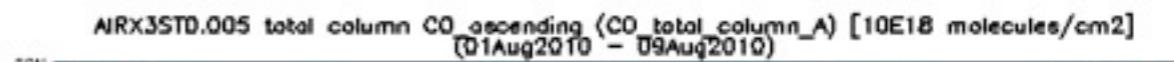
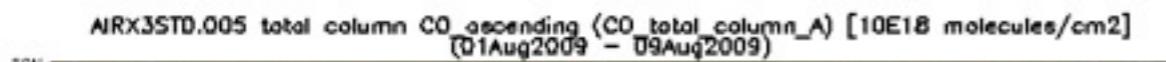
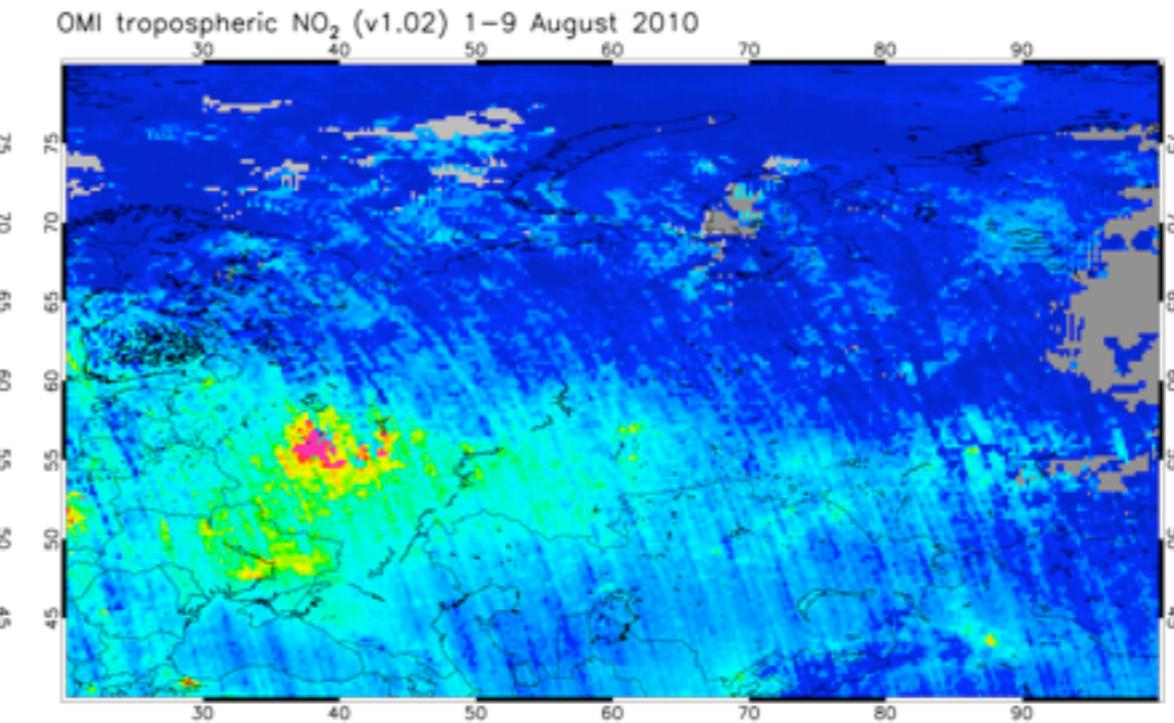
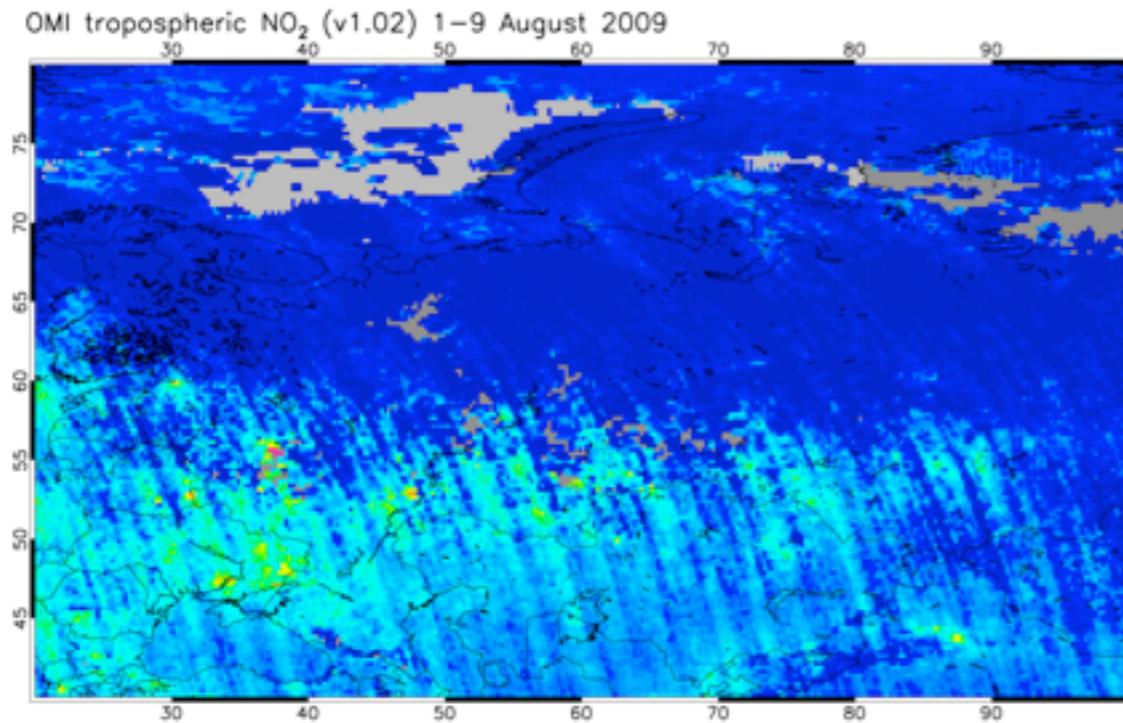
Number of fires in Russia

ATSR World Fire Atlas, Algorithm 1

Tropospheric NO₂ and CO

1-9 August 2009

1-9 August 2010



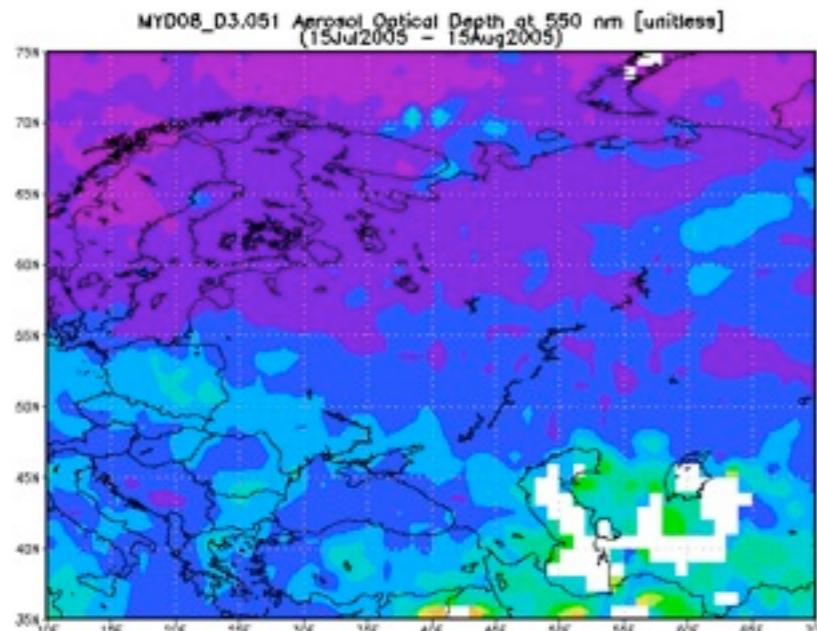
OMI Trop. NO₂

AIRS CO

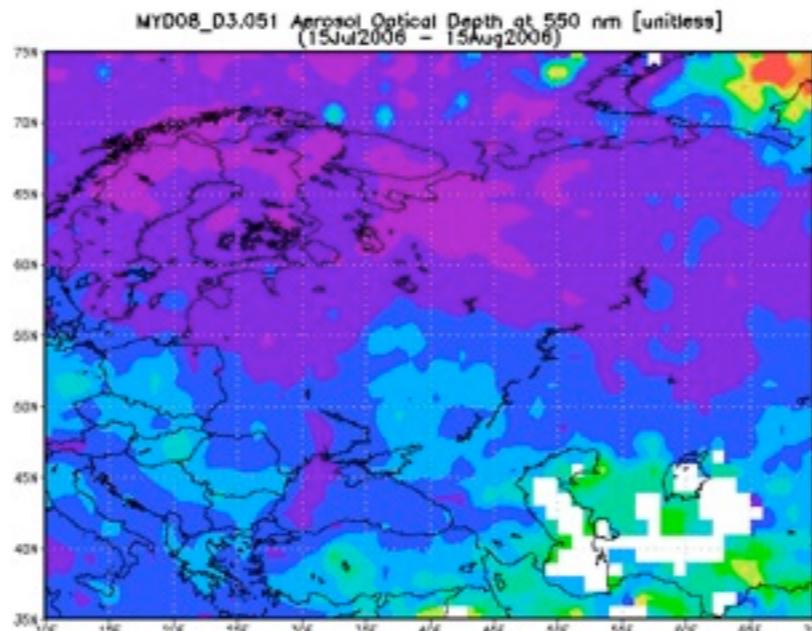
Aerosol Optical Thickness

Mean MODIS Aqua AOT₅₅₀, 15 Jul - 15 Aug

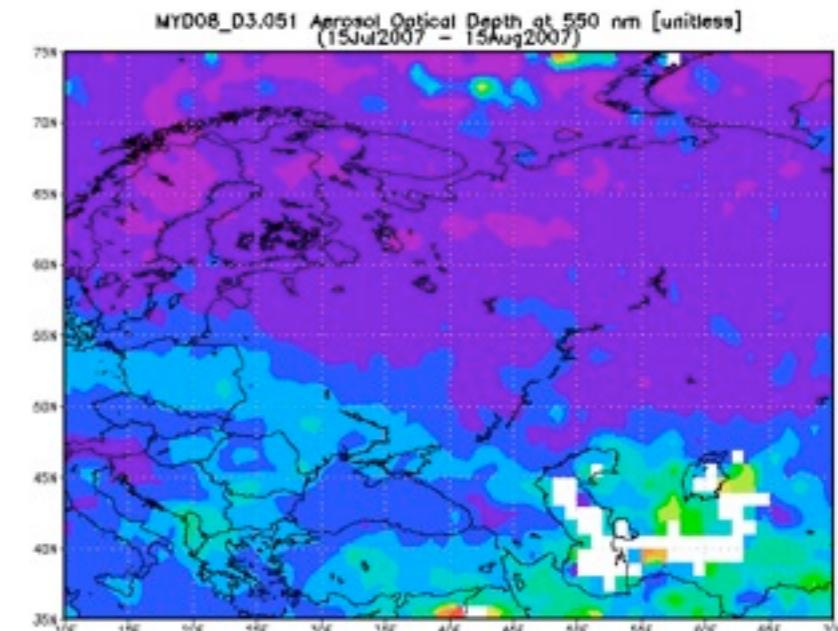
2005



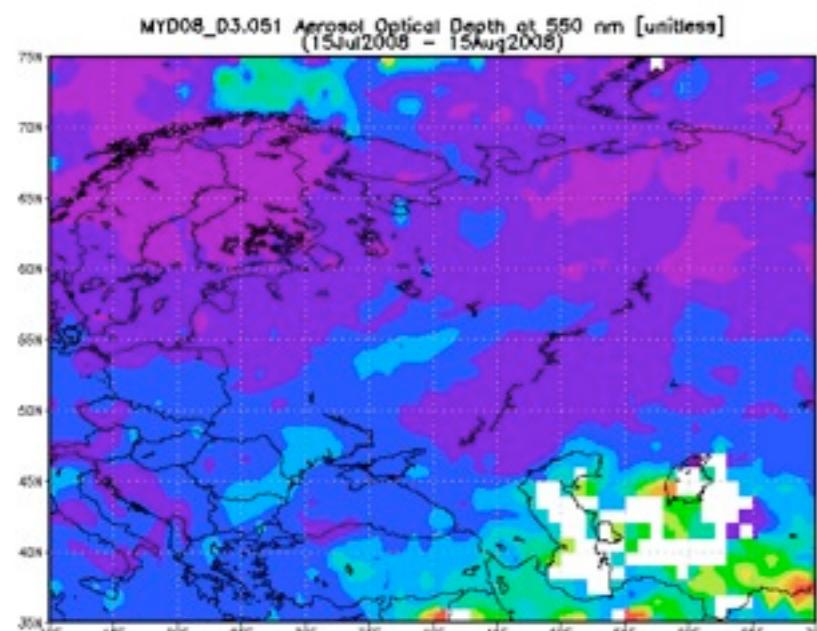
2006



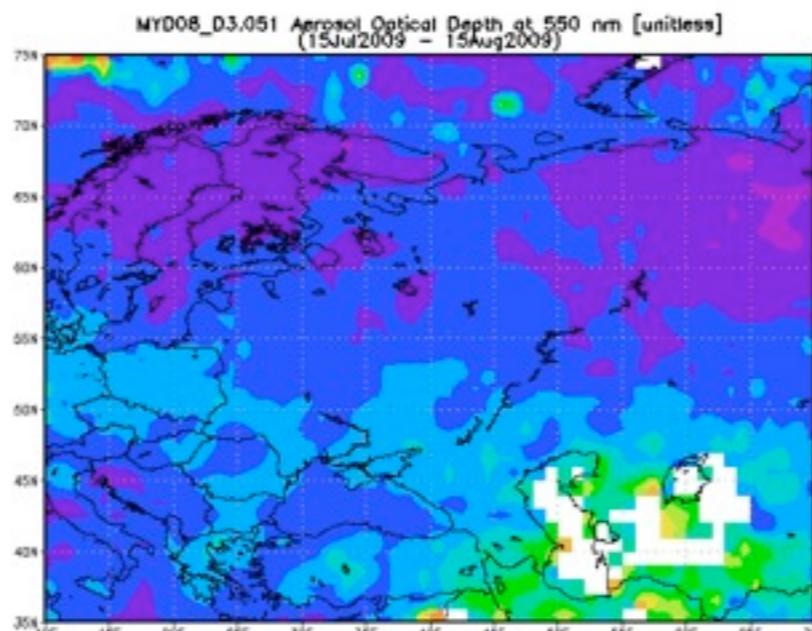
2007



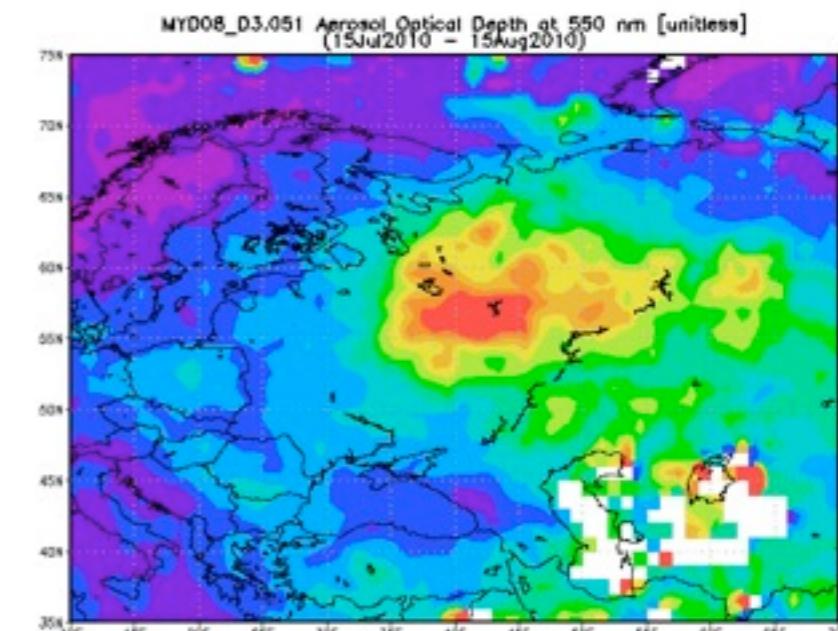
2008



2009



2010

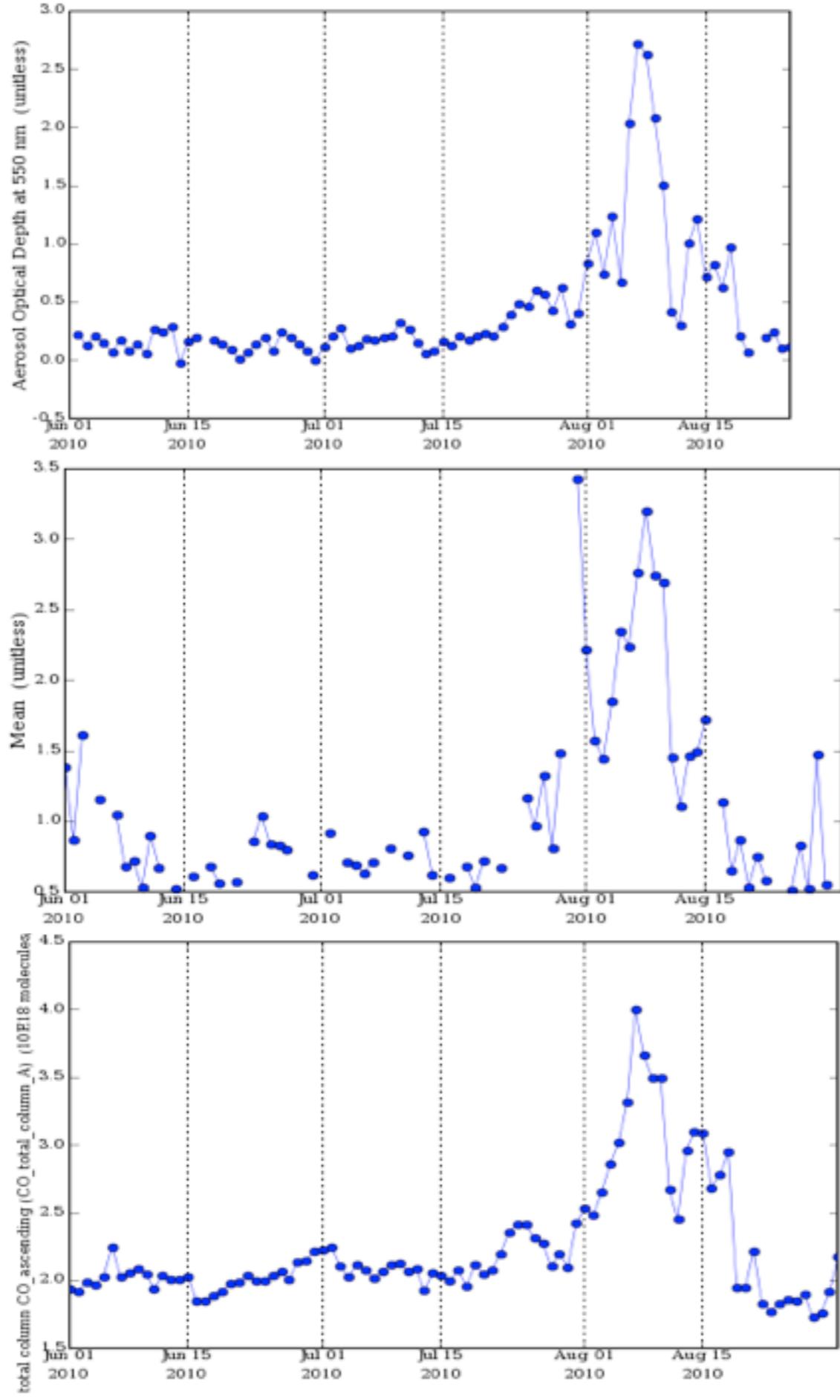


AIRS CO

OMI AAI

MODIS AOT

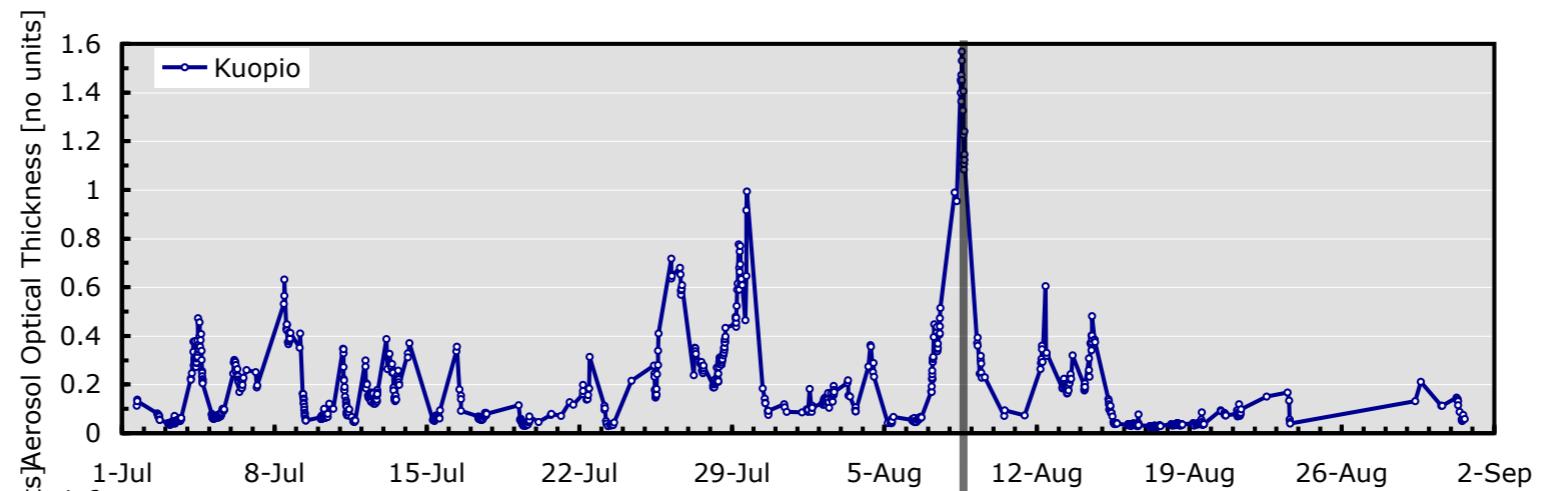
Jun-1 Jul-1 Aug-1 Sep-1



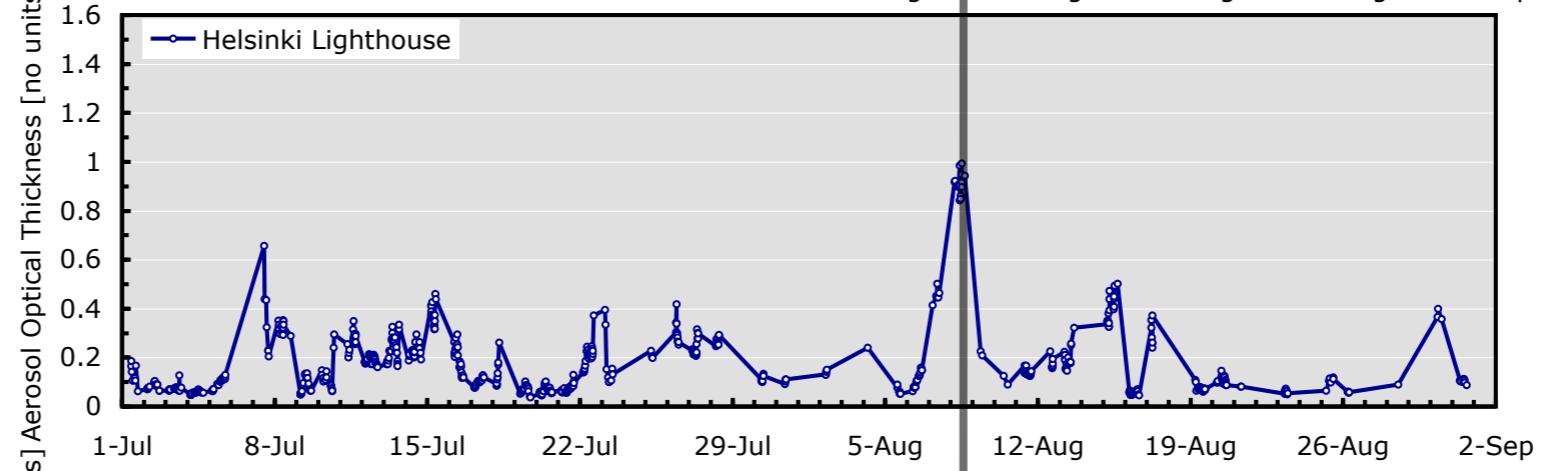
Region around Moscow:
35-40°E, 53-58°N

AERONET AOT_{500 nm}

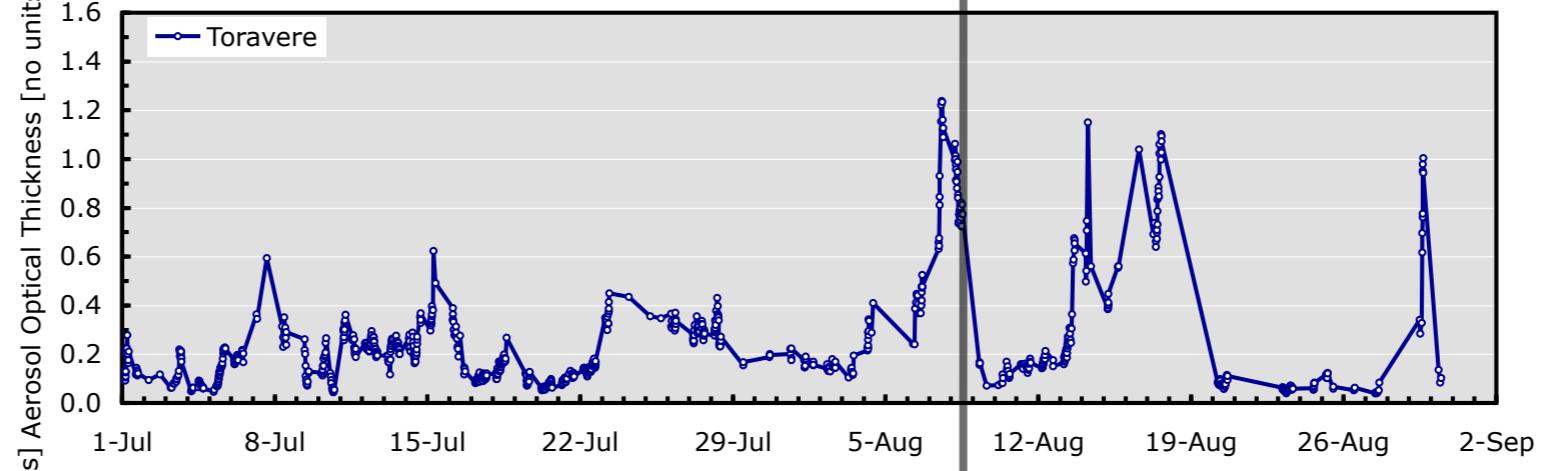
Kuopio



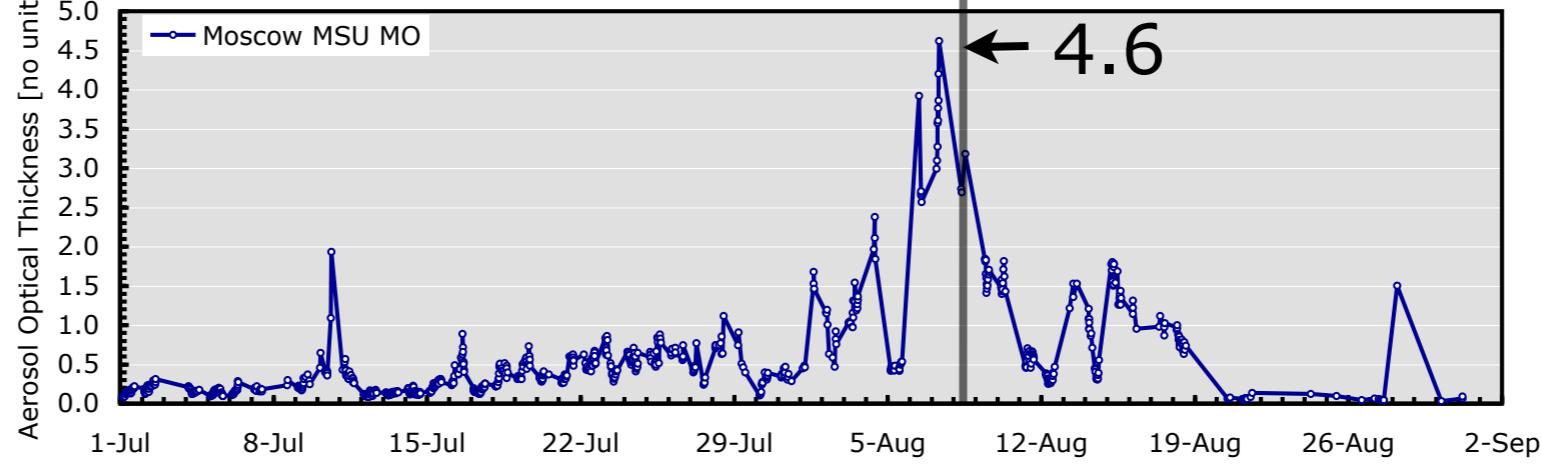
Helsinki



Toravere



MOSCOW



Air Quality Finland



Jyväskylä, 8 August 2010



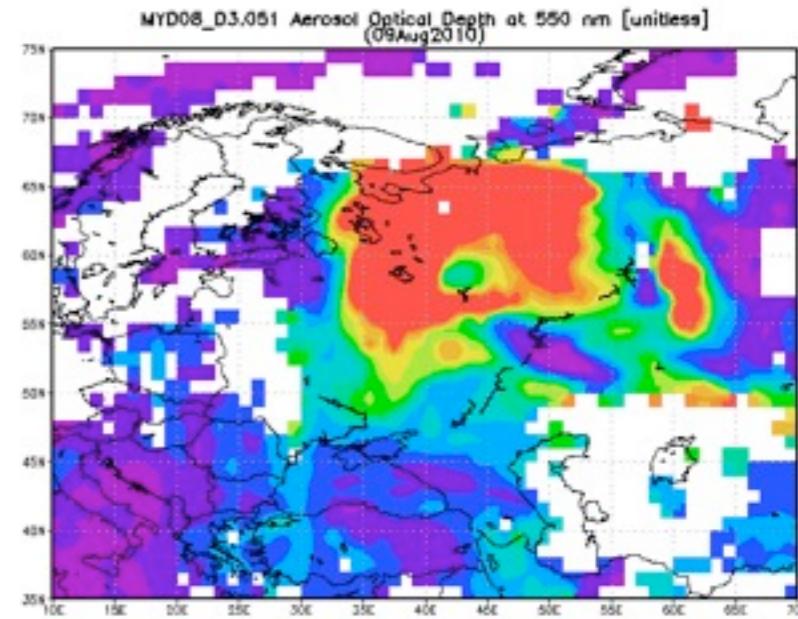
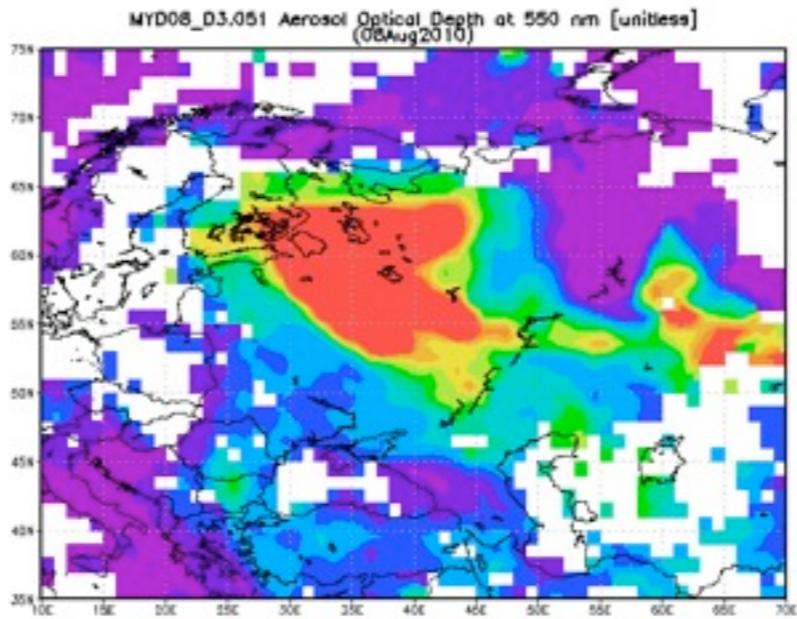
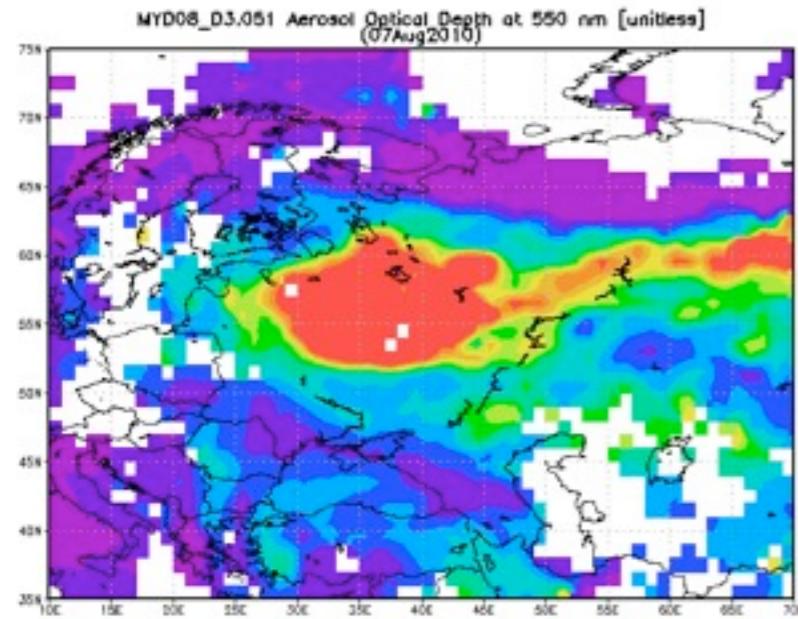
Helsinki, 7 August 2010

2010-08-07

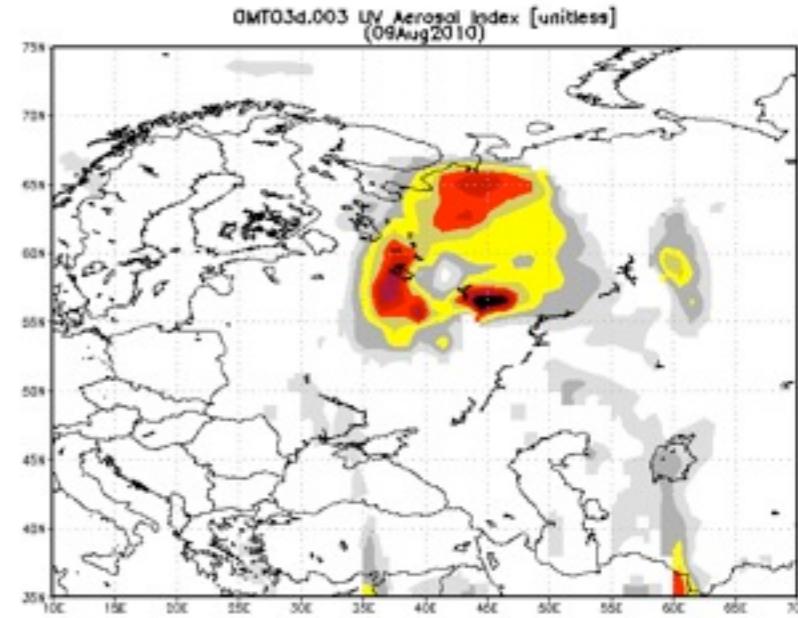
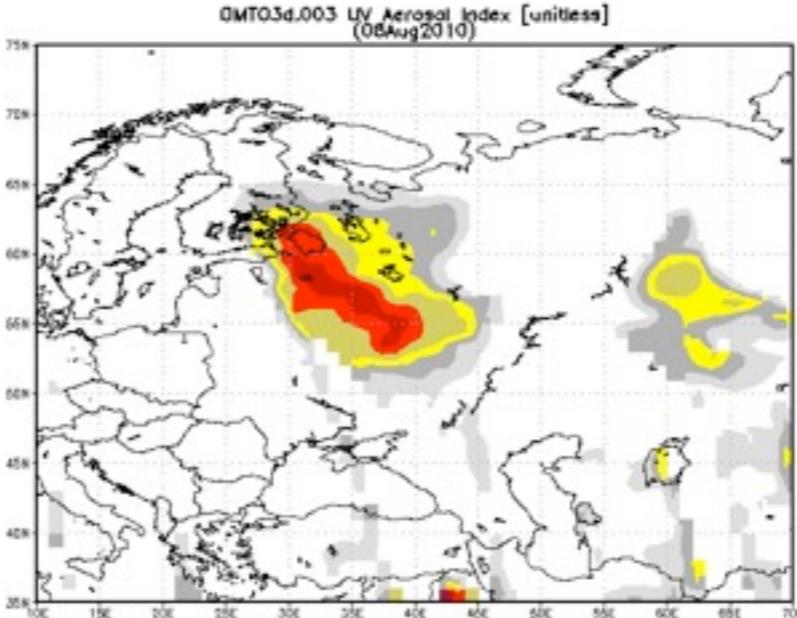
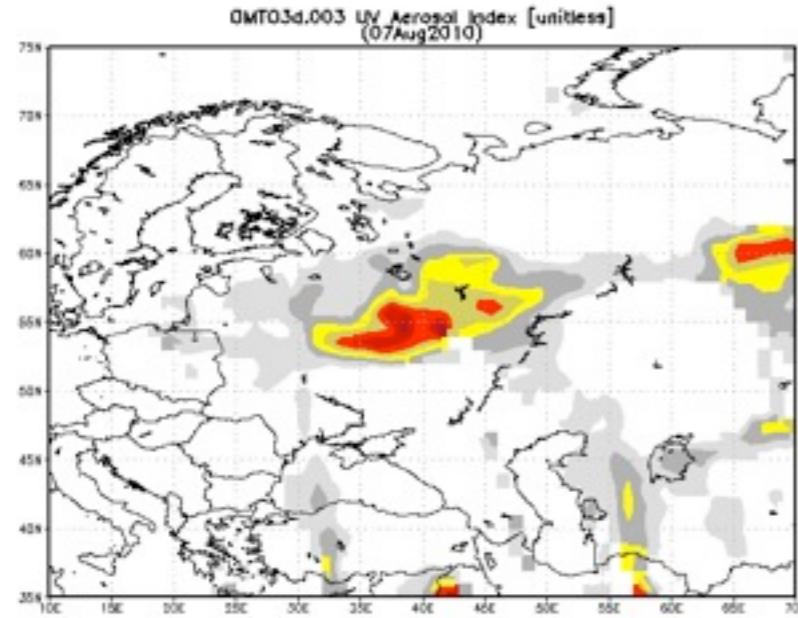
2010-08-08

2010-08-09

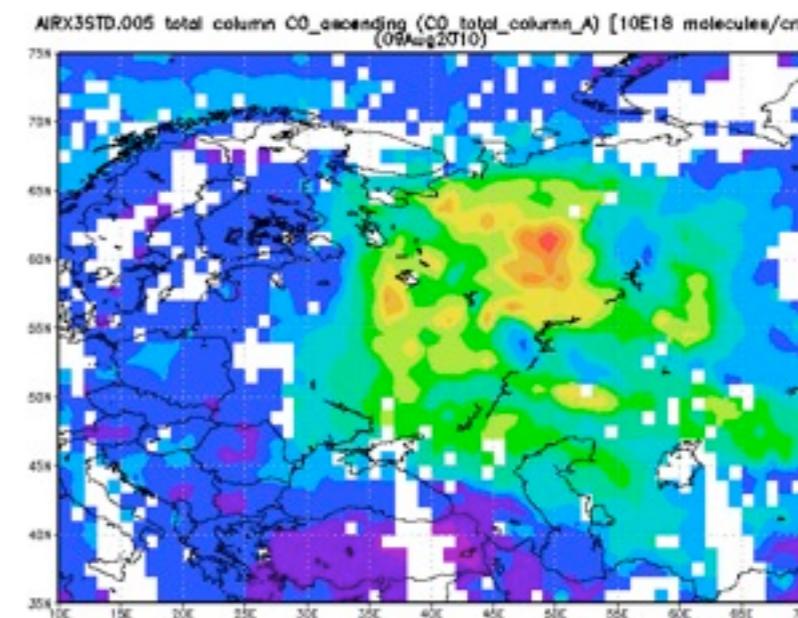
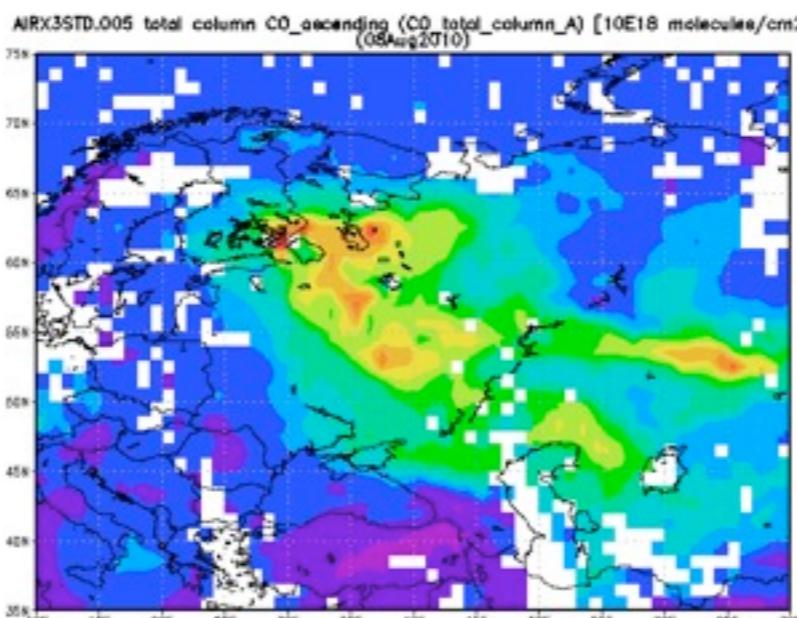
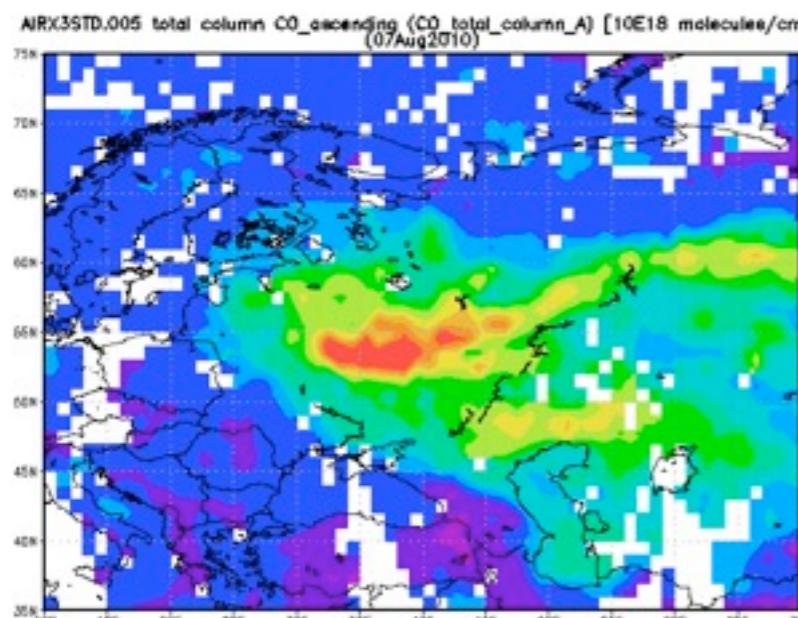
MODIS AOT



OMI AAI

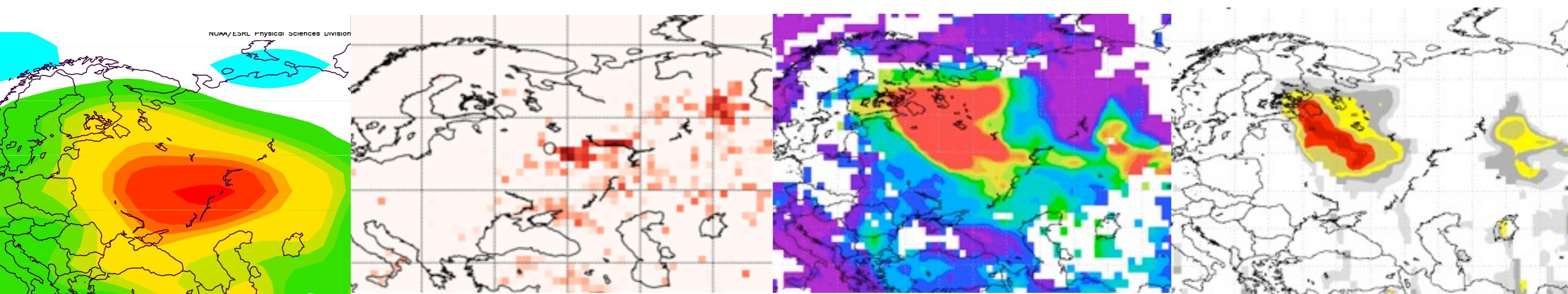


AIRS CO



Conclusions

- Exceptional temperatures and droughts occurred in Russia in summer of 2010.
- The number of fires was higher than any previous years and closer to the Moscow region.
- For a region of ~2000 km x 1000 km the average AOT was higher than 0.6 for the period 15 July until 15 August. Over Moscow the mean AOT exceeded 1 and a maximum of 4.6.
- The positive AAI signal during the event indicates elevated layers of absorbing aerosols.
- The satellite observations of transport of AOT, AAI and CO are very consistent.



Acknowledgments

AERONET: aerneot.gsfc.nasa.gov

AIRS, MODIS: disc.sci.gsfc.nasa.gov/giovanni

ESA-WFA: dup.esrin.esa.it/ionia/wfa

NOAA-ESRL: www.esrl.noaa.gov/psd/data/composites/day

OMI: temis.nl, disc.sci.gsfc.nasa.gov/giovanni

